opened by the gas was quickly closed again by the rapidity with which the triturated rock resolidified. The paper concludes with a suggested application of the hypothesis to the cones and craters of the moon.

In another paper M. Daubrée returns to the subject of the flow of rocks under high pressure. With respect to this point he remarks that, in certain previous experiments, the rock not only accurately moulded itself to the apparatus, but also formed thimble-shaped protuberances outside it. Further experiments were conducted with round plates placed one upon another, instead of the former cylinders. Lead plates were first experimented on, and then these along with plates of rock. One of the most interesting results obtained was the production of little "eruptive cones" of lead or rock outside the apparatus. In one case the protuberance reached the height of 36 mm. After the experiments, some of the plates were found outside the apparatus in the form of circular capsules, so closely fitted into one another as to appear soldered. Some of the lead plates remaining in the apparatus were cut through in their central parts as with a punch. The thickness of these perforated plates was found to be diminished on their borders, and increased in their central portions. This effect may be compared to what occurs in many cases with contorted rocks. At the same time spaces were here and there formed between the plates thus united. Daubrée draws attention to the analogy between these spaces and those occurring between separate strata among contorted rocks, and which are often filled with metallic substances. Lamination was also produced in the plates of rock.

As a general designation for the accumulations of rocky matter crowning the summits of all perforations in the earth's crust opened by gaseous pressure, whether trachytic domes, lava flows, scoriæ cones, or the kopyes of South Africa, M Daubrée proposes the term "ecphysema" (French, *ecphysème*," Gr., *ἐκφυσημα*).

To sum up M. Daubrée's results:—

(1) High pressure gases from below are able to open out channels in the earth's crust, by means of which the same pressure can bring to the surface various products.

(2) In forming such channels the gases may striate and polish the walls of the perforations in a manner recalling that of glacial action.

(3) The products of such erosions are partly of the nature of fine dust, which may be carried to immense distances, and a part of which resembles exactly the so-called cosmic dust.

(4) That the same high-pressure gas can fracture, break up, and pound a rock, and afterwards resolidify the same. That in thus resolidifying, the broken-up rock may mould itself accurately on the bounding walls of its enclosure, so as to take their polish and the impress of the striations upon them And, further, that portions may be thrust outside the apparatus in the form of protuberances of the nature of "eruptive cones." And thus it may be conceived that, by the force of high-pressure gas from below, rocks may be broken up and reconsolidated *in situ* to form breccias of diverse natures.

Some further applications of the experiments may be suggested.

Thus they may perhaps explain the origin of those remarkable natural pits of Hainaut, which have given rise to much discussion. In their general structure these pits are analogous to the diamond pipes of South Africa. Like them they are more or less circular perforations in the rocks, of unknown depth, and filled with rock debris. Since none of the explanations hitherto applied to them seem satisfactory, perforation by high pressure gas may be tried.

Again, in certain of the experiments the faces of the fissures in the cylinders of rock were found to be polished and striated. The polishing and striation of rock surfaces in connection with faults is known as slickensides, and ascribed to the movement of one surface over the other. M. Daubrée's results indicate the possibility that certain slickensided surfaces may rather be due to the energetic action of high pressure gas. In any case it is perhaps a little difficult to understand how a *single* movement of one rock surface over another—if we suppose a fault produced by a continued movement in one direction —could produce anything like a perfect polish. And it cannot be denied that the above experimental result shows the possibility of another cause.

And further, if we accept M. Daubrée's interpretation of his results, we arrive at the remarkable conclusion that gaseous bodies, given sufficiently high pressure and rapid motion, can polish and striate in a way generally supposed to be confined to solid bodies. This, indeed, is in conformity with the general results of advanced physical research which tends to show that, under sufficient pressure, hard and solid bodies can be made to act as liquids, while soft and even gaseous bodies, if endowed with sufficient force and speed, act like solids.

If, then, a gaseous body, under certain conditions of speed and pressure, can polish and striate a rock without the intervention of solid particles, is it not possible that ice, given certain conditions of speed and pressure, may likewise striate and polish without the graving tools usually considered necessary? The conception of an ice-sheet, or glacier, moving over the rock surface of the country with a series of pebbles and boulders firmly frozen into its lower surface is difficult to reconcile with the physics of ice masses in motion. Hence it seems worth while to make a trial application of the experimental results in this direction likewise. Even if we do not accept M. Daubrée's view that the striation of the rock surface was accomplished by the gas alone, and hold that the intervention of solid particles was required, there is still a possible application to glacial action. For if solid particles simply carried along by a rapidly-moving gas can produce parallel striations, may not particles simply carried along by the ice do likewise without being held firmly frozen into its mass? On either view, in fact, a difficulty in the conception of how a glacier striates and polishes is removed.

NOTES.

The professors of the University of Melbourne have interviewed the Premier on the subject of the decrease in the grant to that institution. They said that there was no possibility of reducing the present staff, as it was not overmanned. Many of their number had come to the colony under special contract with the authorities of the university, and it would be a serious matter if faith were broken with them by insisting on a reduction in their salaries. Mr. Patterson replied that these were times of retrenchment, and it was right that everybody should contribute something to pull the country out of its difficulty. It appeared, however, that the University had been cut down £5000 last year, and it was further proposed to reduce the expenditure on the institution by £3000. He reiterated generally the statement made by the Minister of Education on the subject of retrenchment, but he promised to hold a consultation with Mr. Campbell, with the view of ascertaining if anything could be done in the matter. He thought it possible that Mr. Campbell, on taking a review of the special circumstances of their case, might see his way to some abatement of the rigorous course which had been proposed.

A meeting of the Executive Committee of the Rothamsted Jubilee Fund was held on Monday, the Earl of Clarendon in the chair. On the motion of the Chairman, the Duke of Devonshire, as the incoming President of the Royal Agricultural Society of England, was added to the Committee. Sir John

Evans (hon. treasurer) reported that the fund now amounted to £572 13*s.*, that the granite memorial proposed to be set up in front of the Laboratory at Rothamsted was nearly ready, and that the portrait of Sir John Lawes, by Mr. Hubert Herkomer, was in progress. It was decided to request the Minister for Agriculture to preside at the dedication of the memorial and the presentation of addresses to Sir John Lawes and Dr. Gilbert by various learned societies, on Saturday, the 29th inst., at 3 p.m. It was also decided that the fund should not be closed until after the presentation, and subscriptions (not exceeding two guineas) will be received until further notice by Mr. Ernest Clarke, hon. secretary, at 12, Hanover Square.

The next meeting of the Australasian Association for the Advancement of Science will commence in Adelaide, South Australia, on September 25, 1893, under the presidency of Prof. Ralph Tate, of the University of Adelaide. The Association has been in existence since 1888, and now numbers over 900 members. The four previous meetings, held at Sydney, Melbourne, Christchurch, and Hobart, under the presidencies respectively of Mr. Russell, Baron von Mueller, Sir James Hector, and Sir Robert Hamilton, K.C.B., have been very successful. It is hoped that some visitors from the old country may be induced to attend the coming meeting, where they may count upon a cordial welcome. The time fixed is eminently suitable for visitors; and in previous years the Colonial Governments and the local steamship companies have granted substantial reductions of fares to members of the Association, and it is anticipated that the same privileges will be continued on the present occasion. We may add that at the request of the local secretaries, two former members of the Adelaide University, Prof. T. Hudson Beare, of University College, London, and Prof. Horace Lamb, of the Owens College, Manchester, have underaken to answer inquiries, and to give all information in their power to intending visitors.

Dr. Archibald Sandemann, who at one time was Professor of Mathematics at Owens College, Manchester, died at Perth a few days ago. He was seventy-one years of age.

At a special general meeting of the Geological Society, on June 21, it was decided to have an index prepared to the first fifty volumes of the Quarterly Journal, at an expenditure not exceeding £450. If possible, the index will be issued early in 1895, in two numbers in paper covers, uniform with the Quarterly Journal, and as a supplement to volume fifty.

At the first meeting of the recently elected Council of the Institution of Civil Engineers the following reappointments were made:—Mr. Hugh Lindsay Antrobus as Treasurer, Dr. William Pole, F.R.S., as Honorary Secretary, and Mr. James Forrest as the Secretary. The Council consists of Mr. Giles, President; Sir Robert Rawlinson, K.C.B., Sir B. Baker, K.C.M.G., F.R.S., Sir Jas. N. Douglass, F.R.S., and Mr. J. Wolfe Barry, Vice-Presidents; Dr. William Anderson, F.R.S., Mr. Alex. R. Binnie, Sir Douglas Fox, Sir Charles Hartley, K.C.M.G., Mr. J. C. Hawkshaw, Mr. Charles Hawksley, Prof. Alex. B. W. Kennedy, F.R.S., Sir Bradford Leslie, K.C.I.E., Mr. James Mansergh, Sir Guilford L. Molesworth, K.C.I.E., Mr. W. H. Preece, F.R.S., Sir Edward James Reed, K.C.B., F.R.S., M.P., Mr. William Shelford, Mr. F. W. Webb, and Mr. W. H. White, C.B., F.R.S.

A meeting of the Yorkshire Naturalists' Union will be held at Kirkwood, Moorside, on Monday, July 10, for the investigation of the neighbourhood of Donthwaite Dale, Sleightholme Dale, and Kirkdale.

The curator of the Maidstone Museum has printed and is circulating an Exchange List of duplicate lepidopterous insects contained in the museum. It embraces the Rhopalocera only, and upwards of 5000 specimens are available for distribution. Copies of the Exchange List can be had on application. The housing and proper supervision of duplicate natural history specimens has become in many museums a serious tax upon the ingenuity and time of the curators, and it would seem very desirable that exchange lists should become more general than is the case at present. Their value would be greatly increased, moreover, if for this purpose a uniform system of nomenclature were adopted.

Two prizes of $150 and $75 respectively will be awarded by the Anthropological Society of Washington at the end of this year for the best essays on the elements that go to make up the most useful citizen of the United States, regardless of occupation. The prizes are open to competitors of all nationalities. While it is not proposed by the Society to limit the scope of the discussion, and while each essay will be considered on its merits by the Commissioners of Award, it is suggested, in view of the character of the Society and the wishes of the donor of the prize fund, that the treatment be scientific, and that the potential citizen be considered (1) from the point of view of anthropology in general, including heredity, anthropometry, viability, physiological psychology, &c.; (2) from the point of view of personal characteristics and habits, such as care of the body, mental traits, manual skill, sense training and specialisation, and all-round manhood; and (3) from the ethical point of view, including self-control, humanity, domesticity, charity, prudence, energy, *esprit de corps*, patriotism, &c. Essays submitted in competition for the prizes should be delivered not later than November 1, 1893, to the Secretary of the Board of Managers of the Society, Mr. Weston Flint, No. 1101 K Street, N.W., Washington, D.C., to whom all correspondence relating to the prizes should be addressed.

We are requested by the Imperial and Royal Austro-Hungarian Consulate-General to call attention to the charitable foundation instituted by the Sisters Froehlich at Vienna, for making pecuniary grants to persons who have distinguished themselves in art, science, or literature. The grants are made irrespective of nationality, provided that the applicants are resident in Austria. Further information can be obtained at the Imperial and Royal Austro-Hungarian Embassy, 18 Belgrave Square, S.W.

A correspondent, writing to the *Pioneer Mail*, says that Murree was visited by a terrific hailstorm on May 28. The hailstones are described as being fully the size of racket balls, and they bounded from the ground to a height of four or five feet. They did a large amount of damage to trees and flowers, and strewed the neighbourhood with small branches and leaves. Numerous panes of glass were broken, and the ground was covered with hail to a depth of between two and three inches.

In the *Repertorium für Meteorologie* (vol. xvi.) A. Schoenrock describes a remarkable oscillation of temperature at St. Petersburg and neighbourhood on February 11 last. On the 10th the thermometer rose all day, the readings being – 12°·1 F. at 7 a.m., –0°·4 at 1 p.m., 23°·4 at 9 p.m., and at about 3.45 a.m. of the 11th, 28°·4. At this time the thermometer began to fall very rapidly, the decrease being no less than 23° in the course of a quarter of an hour, and by 7 a.m. it had fallen to 2°·6. The wind, which had been southerly on the morning of the 10th, suddenly changed to east-north-east on the morning of the 11th, the force being light on both days. The phenomenon was to a less extent observed at other stations around St. Petersburg; to the eastward it did not reach beyond Ssermaxa, but the westerly limit could not be determined for want of stations.

A USEFUL discussion of the normal distribution of the rainfall in the Madras Presidency, based on the records of twenty years (1870-89), has been published by C. Benson, Deputy Director of the Department of Land Records and Agriculture. The year has been divided into four periods:—(1) the hot weather, April and May; (2) the south-west monsoon, June to September; (3) the north-east monsoon, October to December; and (4) the dry weather, January to March. And the Presidency has been divided into sixty-four tracts, or groups of stations, lying in physico-geographical areas which showed, on inspection of the records, the greatest similarities. The results of the annual distribution of rainfall, from which we take a few extracts, shows that this selection of areas is correct in principle, and that any general average for the whole Presidency would be, as the author states, misleading in the extreme. Over the greater part of the Presidency the heaviest rainfall is brought by the south-west monsoon; the north-east monsoon only brings any considerable amount along the Coromandel coast. Over the whole of south Canara and in the northern part of the Wynaad the annual fall exceeds 125 inches, and in a portion of the former it amounts to nearly 180 inches. On the coast of Malabar it amounts to from 108 to 117 inches, while further inland, in the same district, it is only about 75 inches. Besides the above localities, it is only on the western slopes of the Nilgiris, where the annual fall amounts to rather over 90 inches, that it anywhere exceeds 70 inches. In a few other localities the rainfall exceeds 50 inches, while it is only over a comparatively small portion of the Presidency that the annual fall amounts to 40 inches, and over a very large section of it it does not reach 30 inches. The dryest section of the Presidency lies in the Bellary and Anantapur districts to the north of Mysore, where the average rainfall does not reach 21 inches.

THERE is perhaps no micro-organism which has been so exhaustively studied as regards its behaviour in water as the *Bacillus anthracis*. The list of memoirs on this subject has moreover been lately increased by the elaborate report just issued to the Water Research Committee of the Royal Society, entitled, "The Vitality and Virulence of *B. anthracis* in Potable Waters," by Percy Frankland and M. Ward. Additional interest and importance must however now be attached to these researches, inasmuch as quite recently this organism has been actually discovered in the mud at the bottom of a well ("Bactéries charbonneuses dans la vase du fond d'un puits," by Diatroptoff, *Annales de l'Institut Pasteur*, March, 1893). An epidemic of splenic fever broke out amongst some sheep on a farm in the South of Russia. Thinking that the disease might be connected with the use of a particular well water, the latter was bacteriologically examined. Diatroptoff was unable to discover the anthrax bacillus in the water, but an investigation of the *mud* at the bottom of the suspected well revealed the presence of an organism, which on inoculation into animals was proved beyond doubt to be the *B. anthracis*. On the well being closed no further cases of anthrax occurred. That the germs of anthrax had in some manner gained access to the well is certain, and opens up the possibility of the communication of this disease by means of drinking water. Moreover the likelihood of such contamination taking place through the drainage from soil, points to the desirability of destroying the carcases of infected animals by cremation rather than by burial.

ACCORDING to Faraday's electrolytic law we ought to obtain the same amount of metal deposited on the anode, for a given current, whatever the composition of the electrodes. However, Dr. Oettel (*Chemiker Zeitung*) finds that with platinum electrodes the deposit of copper is only from 74 to 89 per cent. of that obtained with copper electrodes, the density of the current being 0·13 ampères per square decimetre, and no free hydrogen being liberated. The cause of this divergence is the formation at the anode of persulphuric acid and of hydrogen dioxide, which diffuse in the liquid, and reaching the cathode become reduced, causing a diminution in the quantity of metal deposited. The addition of an easily oxydised body, such as formic acid, annuls the action of these secondary products, and increases the quantity of copper deposited to 98·7–99·6 per cent. of the theoretical quantity. Alcohol is still more efficacious, 99·9 per cent. being obtained.

DR. OETTEL has also investigated the divergences observed in the weight of the deposit in the copper voltameter when an acid solution is employed. The divergences are of such a magnitude that it has been generally recommended to use a perfectly neutral solution, although the resistance is in this case much higher. The author, however, finds that, with a current density less than 0·3 ampères per square decimetre, the neutral solution gives too heavy a deposit. When an acid solution to which alcohol has been added is used, the results agree with those obtained with the silver voltameter. The best results are obtained with a solution consisting of 15 grms. of copper sulphate, 5 grms. of sulphuric acid, and 5 grms. of alcohol mixed with 100 grms. of water, the current density being between 0·06 and 1·5 ampères per square decimetre.

A LETTER from Sir David Salomons appears in the *Electrician* in which he says that when trying some of the experiments shown at the Royal Society *soirée* by Mr. Pike and himself he found that the attraction between two vacuum tubes far exceeded what theory would expect, if due only to static effects, or to the mutual action of one current upon another. Further experiments (though not yet completed) have shown that:—(1) Two vacuum tubes attract one another strongly. (2) The attraction is almost, if not quite, the same, whether they touch one another along the whole length or only at their ends, one of the tubes being dumb-bell shaped. (3) A spiral vacuum tube sucks in a "core" tube like a solenoid does an iron core, and the more the "core" is drawn in the less luminous the "core" tube appears. The core tube in this experiment was not connected to the circuit. (4) When the tubes are placed end on they attract one another and stick together; no repulsion takes place, which would occur if the effect were of a static nature.

MM. SORET AND GUYE have made an investigation to determine the rotatory power of quartz at low temperatures (*Archives des Sciences Physiques et Naturelles*, Geneva, March 15). During the observations, the specimen of quartz was immersed in alcohol, and the temperature of the liquid was determined by noticing the variation in the resistance of a platinum wire, the readings being compared with those given by an air thermometer. The instruments of research were arranged along an optical bench and the order was first a light source, then one of Cornu's polarising prisms. After the collimator came the bath containing the quartz. A Foucault's analyser followed, and last of all was a direct vision spectroscope minus the collimator. The source of light was a vertical sparking-tube having platinum electrodes arranged at the surface of a solution of bromide of sodium. From the experiments it appears that Joubert's formula (*Jour. de Phys.* 1879, viii. 1) represents approximately the rotatory power of quartz for sodium light down to a temperature of about – 70°.

CONSIDERABLE importance can at present be attached to a study of the properties of solutions of salts in different solvents, for such solutions appear to be the most likely to afford evidence as to the validity of the hypothesis of electrolytic dissociation. From measurements on the magnetic rotatory polarisation of solutions of salts in water, alcohol, pyridine, amyl alcohol, and acetone, Herr Schönrock (*Zeitschrift für physikalische Chemie*, xi. 6, 753) concludes that the specific rotation of a salt is independent of the concentration, and of the nature of the solvent, and that there is therefore no evidence of effects which might be attributed to electrolytic dissociation. Dr. Perkin pointed out in 1889 that the molecular rotation of chlorhydric acid calculated from the behaviour of a solution in water was twice as great as the value deduced from a solution in amyl oxide. This result has been employed by the upholders of the "new" theory of solutions as clearly indicating the effect of electrolytic dissociation. Herr Schönrock finds, however, that chlorhydric acid reacts chemically with amyl oxide, and that if allowance be made for this reaction, chlorhydric acid exerts the same effect on polarised light when dissolved in amyl oxide as when dissolved in water. In the same communication values are given for the specific and molecular rotations of some fatty and aromatic hydrocarbons, fatty alcohols, &c., and relations are established between the magnitudes of these constants which are similar to those discovered by Dr. Perkin. The rotations of solutions of double salts are also treated in the paper.

At a recent meeting of the Berlin Society of Naturalists, Herr Ascherson spoke on the metallic-looking deposit often found on the teeth of ruminating animals in Southern Europe and the East. Hertwig described a silver-like crust on the back teeth of a goat in Xante, as composed of fine lamellæ, and of calcium-carbonate with some iron. In most cases, however, the coating is rather of a gold, bronze, or brass colour, and the yellow pigment is probably of organic origin. It is more common to meet with the deposit on the molars of wild ruminants (especially antelopes) than on those of domesticated animals. Natives of the Mediterranean region say the gold colour is due to eating a mysterious, light-giving plant, very difficult to find, but much desired, as it changes all that it touches to gold, or indicates gold in the ground, or can be used for gold-making. Various plants have been specified as the source of the deposit, one being the Lebanon poppy, the ground leaves of which have a remarkable golden look, very similar to that of goats' teeth, so that a causal relation between the two has seemed natural. Dried remains of the plant, too, have a bright metallic lustre. An examination by Herr Graebner shows the gold colour to have its seat in the moderately thickened cell membranes of the tissues concerned; but the shining look apparently comes from a thick deposit of wax on the epidermis. The teeth of certain fossil ruminants have been found with similar incrustations, *e.g.* molars of Samotherium from the miocene of Mitylene in Samos.

At the bottom of the valley of St. Martin, near Millau (Aveyron), the Boundoulaou grotto pierces the calcareous rocks of a promontory of the Larzac. There are four entrances on the face of the cliff; the most practicable lies on the western flank at a height of 535 m., and may be reached with the help of a ladder 14 m. long. It was explored last autumn by M. E. A. Martel, who, in conjunction with M. Émile Rivière, describes his finds in the *Comptes Rendus*. It was found to consist of three galleries, one above the other, the lowest of which contained a lake which fed two perennial springs emerging at a point lower down. This lake was explored with great difficulty in a canvas boat under a vault hardly 1 m. high. In the middle of the cave was found a kind of dome 25 m. high and wide, evidently hollowed out by water. In the upper gallery, 15 m. above the level of the lake, the explorers encountered a neolithic bone deposit containing a large fragment of pottery, a well-made cylinder of bone, and seven human skeletons. Three of these were arranged side by side under a sort of shed of rocks, with their heads touching each other. It seemed as if these persons had been surprised and drowned by a sudden flood of the lake below. One of the skulls is that of a young male adult remarkable for the thickness of the cranial bones and for the want of complexity in the sutures. The second complete skull belongs to a subject not completely grown up, and probably of the female sex. Besides these skulls many other human remains were found, including six mandibles, seven humeri and one cubitus, three femurs and five tibias, and one left ilium, amounting in all to traces of seven skeletons. Speaking generally, the type resembles that of the Caverne de l'Homme Mort (Aveyron). An interesting relic also found was a bone cylinder made of the diaphysis of a human femur, and probably representing an amulet or a trophy of war.

A biological station has been recently started on Heligoland. According to the recent report of the director, Herr Heinke, it contains, with other rooms, six workrooms with excellent light, one for the director, two for the assistants, a fourth for Dr. Kuckuck (who is engaged on the marine flora of the island), while the two others are for "ambulant" naturalists. The conditions of occupation of these will soon be published. The cellar space is being arranged for aquaria. Several boats with dredging and fishing apparatus are at the disposal of the inmates. One of these is a launch with petroleum motor; it has a small cabin, with cooking-stove, &c., so that the whole day can be spent comfortably on the sea. In the summer months arrangements will be made for excursions of several days. A few months' researches on the fauna and flora round Heligoland have revealed a greater richness in these than had been supposed. New forms, not before observed in the German North Sea, have come to light almost daily. The ichthyologist finds Heligoland a rich field; and interesting studies can be prosecuted on the larval forms of crustacea, on mimicry and protective colours in marine animals, and their relations to marine plants, &c.

Mr. Thomas E. Bean contributes to the *Entomologist* for July the results of a fairly extensive breeding of *Colias christina* and *C. elis*, undertaken with a view of determining whether more male or female butterflies are produced. From seventeen separate broods of *C. christina*, 116 males and 143 females were raised, and nine broods of *C. elis* gave 32 males and 69 females. All the families were subjected to uniform treatment and condition, hence the results show that some cause or causes control the development of sex entirely apart from the influence of variations in nutrition. The sex proportions do not seem to be determined by the seasonal stage at which the eggs are laid, and Mr. Bean thinks that in some cases at least sex is dependent upon antecedent causes, the influence of external conditions not applying.

A number of special articles contributed to the *Hampshire Observer*, by the Rev. R. H. Clutterbuck, on the Whites of Selborne, Fyfield, and Abbots Ann, will shortly be published at the office of the journal, Winchester.

Messrs. Dulau and Co. have just issued parts xxiii. to xxvii. of their catalogue of zoological and palæontological works. They include works on general Entomology, Coleoptera, Diptera, Hemiptera, and Hymenoptera.

Mr. James Britten and Prof. G. S. Boulger have reprinted from the *Journal of Botany* their "Biographical Index of British and Irish Botanists." It is largely rewritten, and completed down to the end of 1892, giving the names and other information respecting all British (and Irish *sic*) botanists known to the editors who had died before that time. It contains 1825 names.

The Ealing Microscopical and Natural History Society has issued its sixteenth annual report. In it are given abstracts of lectures delivered at meetings of the Society during 1892, and some notes on the local forms of *Helix memoralis* and *hortensis*, prepared by Mr. A. Belt. There are few societies in the environs of London that are able to publish such satisfactory reports of their proceedings.

IT is only in a very narrow and restricted sense that statistical information gained by the ordinary census can be accepted as an indication of the educational status of a country. However, an attempt was made to obtain some figures under this head during the census of the colony of Tasmania in 1891. The standards taken was the ability to read and write, to read only, and to be able to do neither. The tabulation of the results of the inquisition shows that the percentage of persons who said they could read and write reached a maximum of 95·04 between the ages of fifteen and twenty, and then decreased gradually to 55·68 for persons of eighty-five years of age and over. Of all the persons whose respective ages were not less than fourteen, 88·77 per cent. could read and write, 3·50 per cent. could read, and 7·73 per cent. avowedly lacked the qualifications for either of those classes.

MR. S. COTTERELL has compiled a little handbook to various publications, documents, and charts connected with the rise and development of the railway system of Great Britain and Ireland. The book is published by Mr. Edward Baker, John Bright Street, Birmingham. It is a compact little bibliography of railway matters, and deserves to be issued in a much better form than it is at present.

TWO papers are contributed to the current journals upon the hitherto unisolated tetrachloride of lead. The earlier of the two, by Prof. Classen and Herr Zahorsky of the Aachen laboratory, is communicated to the *Zeitschrift für Anorganische Chemie*. During the course of an interesting series of experiments with liquid chlorine, it was observed that the liquid was entirely without action upon pure lead dichloride, $PbCl_2$, but that in presence of concentrated hydrochloric acid a solution of tetrachloride of lead was produced. Twenty-five grams of lead chloride were placed in two hundred cubic centimetres of fuming hydrochloric acid, and the mixture cooled by means of ice and salt. Liquid chlorine was then added and the vessel closed. After two days the lead dichloride had all disappeared and a homogeneous yellow liquid remained, consisting of a solution of lead tetrachloride in hydrochloric acid. All attempts to isolate the tetrachloride were unavailing, but upon adding ammonium chloride a double salt of the composition $2PbCl_4.5NH_4Cl$ crystallised out. This salt, containing tetrachloride of lead, forms yellow crystals which are quite permanent in closed vessels and withstand a temperature of 100° without change. The crystals are decomposed by water. If only a small quantity of water is added the dichloride separates and a solution of hypochlorous acid is formed. If much water is added a clear brown solution is produced which probably contains plumbic acid, $Pb(OH)_4$; this solution rapidly decomposes with separation of lead dioxide, PbO_2.

THE second paper, by Prof. Friedrich, of Graz, is contributed to the *Berichte*. Prof. Friedrich has succeeded in isolating the pure tetrachloride itself, $PbCl_4$. A solution in hydrochloric acid was first obtained by the action of chlorine gas on lead dichloride suspended in hydrochloric acid. From this the double salt with ammonium chloride was prepared by the addition of sal-ammonia to the liquid product. According to Prof. Friedrich, the composition of this salt is represented by the formula $PbCl_4.2NH_4Cl$. It was obtained in well-defined combinations of the octahedron and cube, and would appear to be isomorphous with the corresponding tin salt, $(NH_4)_2SnCl_6$, the well-known *pink salt* which was formerly so largely used as a mordant for madder dyes. When this double salt containing tetrachloride of lead is placed in strongly cooled oil of vitriol a somewhat energetic reaction occurs, the chloride of ammonium being decomposed with evolution of hydrochloric acid gas. But, strange to say, the tetrachloride of lead is not attacked by concentrated sulphuric acid, and it separates in yellow drops, which finally coalesce to form a heavy yellow liquid, which sinks to the bottom of the vessel. This may be purified by repeated agitation with oil of vitriol, and is eventually obtained after separation as a clear, yellow, very highly refractive, heavy but mobile liquid, which yields numbers upon analysis agreeing with the formula $PbCl_4$, fumes in contact with moist air, and decomposes slowly with separation of lead dichloride and escape of chlorine gas. Upon warming it suddenly decomposes with explosion, the dichloride of lead being produced in the form of a cloud tinted somewhat yellow by the free chlorine. Its specific gravity at 0° is 3·18. At − 15° it solidifies to a mass of yellow crystals. With a little cold water it forms a hydrate, probably $Pb(OH)_4$, which readily decomposes, and with excess of water it yields a precipitate of peroxide of lead PbO_2. When added to a little very cold concentrated hydrochloric acid a crystalline compound, probably of the composition $PbCl_4.2HCl$, is formed. When mixed with oil of vitriol and warmed in a current of hydrochloric acid gas the liquid may be partially distilled. As soon, however, as temperature reaches about 105° explosion occurs, as described above. In this respect, also, lead tetrachloride resembles tetrachloride of tin, which may be distilled without decomposition from a mixture with sulphuric acid.

NOTES from the Marine Biological Station, Plymouth.—Recent captures include large swarms of Salps, the nurses and young chains of *Thalia democratica-mucronata*. From the 15th to the 25th they were very common and in good condition; after the 25th they became reduced in number, and were much injured by the storm which occurred last week. In addition to the above there were observed numbers of *Obelia* and *Thaumantias* medusæ; and from time to time Echinoderm, Annelid, and Müller's larvæ, as well as *Cyphonautes* and the *Eudoxia* larva of *Muggiæa*. The Mollusc *Nassa incrassata* is now breeding.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*, ♂) from India, presented by Mr. W. Henegan; a Rhesus Monkey (*Macacus rhesus*, ♀) from India, presented by Mr. J. H. Brown; three Common Marmosets (*Hapale jacchus*) from Brazil, presented by Mr. Hope Gibson; a Brown Bear (*Ursus arctos*, ♀) European, presented by Mr. F. Collier, F.Z.S.; two Wild Swine (*Sus scrofa*, ♂ ♀) from North Africa, presented by Mr. Jasper A. Mathews; a Purple Heron (*Ardea purpurea*) British, presented by Mr. R. Heywood; a Leadbeater's Cockatoo (*Cacatua leadbeateri*) from Australia, presented by Mrs. Anna Margaret Hills; a Guilding's Amazon (*Chrysotis guildingi*) from St. Vincent, W.I., two Tree Boas (*Corallus hortulanus*) from Grenada, W.I., presented by the Hon. Sir Walter Hely-Hutchinson, K.C.M.G.; a Brazilian Cariama (*Cariama cristata*), a Barn Owl (*Strix flammea*), a King Vulture (*Gypagus papa*), a —— Buzzard (*Buteo* sp. inc.) from Brazil, presented by Mr. Howard C. Wolfe; an Illiger's Macaw (*Ara maracana*), two yellow-headed Conures (*Conurus jendaya*) from Brazil, two Rufescent Teguexins (*Tupinambis rufescens*) from Mendoza, deposited; six European Beavers (*Castor* ——) from the river Rhone, France, eight Garganey Teal (*Querquedula circia*), six Common Teal (*Querquedula crecea*) European, purchased; a Thar (*Capra jemlaica*, ♂), two Black-headed Gulls (*Larus ridibundus*) bred in the Gardens.